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THE TRANSFER

OF THE

UNITED STATES WEATHER SERVICE

TO A CIVIL BUREAU.

HISTORIC SKETCH. — REPLIES TO OBJECTIONS AGAINST THE TRANSFER. — PRESENT NEED OF TRANSFER. — OPINIONS OF SCIENTIFIC MEN. — OPINIONS OF THE PRESS. — SUPPLEMENT.

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HISTORIC SKETCH.

THE eastward movement of storms near the Atlantic coast was discovered by Benjamin Franklin. As early as 1836, Prof. Elias Loomis, by means of reports from scattered weather observers, was able to construct and afterwards publish charts distinctly showing the movement of a severe storm from the Mississippi valley to the Atlantic seaboard. In the annual report of the Smithsonian Institution for 1847, the secretary (Joseph Henry) writes: —

"Another subject of research mentioned in the program, and which has been urged upon the immediate attention of the Institution, is that of an extensive system of meteorological observations, particularly with reference to the phenomena of American storms. . . . The present appears to be particularly auspicious for commencing an enterprise of the proposed plan. The citizens of the United States are now scattered over every part of the southern and western portions of North America, and the extended lines of telegraph will furnish a ready means of warning to the more northern and eastern observers to be on the watch for the first appearance of an advancing storm."

This is one of the earliest suggestions for the use of the telegraph for storm warning. By 1849 the Institution had an organized body of weather observers reporting to it, and in the secretary's report for this year he says: —

"Successful applications have been made to the presidents of a number of telegraph lines to allow us, at a certain period of the day, the use of wires for the transmission of meteorological intelligence. . . . As soon as they [certain meteorological instruments, etc.] are completed, the transmission of observations will commence."

In 1857 he writes: —

"We are indebted to the National telegraph line for a series of observations from New Orleans to New York, and as far westward as Cincinnati, which have been published in the *Evening Star* of this city.

"We hope in the course of another year to make such an arrangement with the telegraph lines as to be able to give warnings on the eastern coast of the approach of storms, since the investigations which have been made at the Institution fully indicate the fact that, as a general rule, the storms of our latitude pursue a definite course."

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The outbreak of the Civil War prevented the development of the incipient weather service. After the war. the attempts to organize a weather service were renewed, and Prof. Cleveland Abbe, by the assistance of the Cincinnati Chamber of Commerce, was enabled to obtain a number of weather telegrams from distant cities, and on Sept. 1, 1869, began the regular publication of a bulletin containing weather reports and forecasts. Immediately after this, an organized movement, led by Prof. I. A. Lapham, was begun to induce the government to assume this work. This was successful, and Gen. Albert J. Myer, chief of the War Department Signal Service, who had taken much interest in the movement, succeeded in getting the work assigned to his department. The act authorizing the establishment of the War Department Signal Office Weather Service was dated Feb. 4, 1870, and an appropriation of $15,000 was made for its support during the following year.

During succeeding years the appropriation by Congress for the support of the signal service was rapidly increased, until by 1880 nearly a million dollars was being expended. The weather-work had now grown so large as almost entirely to absorb the military features of the service, with which it had no logical, but only an accidental, connection. Realizing this, Gen. Sheridan, who was then at the head of the army, began training men in the regular army for signal-service duty; and both he and the Secretary of War, Robert T. Lincoln, urged that the weather service was out of place in the War Department, and should be changed. Many of the men in the signal service had joined it for its civilian and scientific features, and made an earnest effort to interest Congress and the public in the transfer.

In 1882 Gen. Logan introduced a bill to transfer the meteorological work of the signal service to the Interior Department. In 1884 a joint commission was appointed by Congress, including three members from each house, with a view to inquiring into the method of securing greater economy and efficiency in the scientific work of the government. This commission conferred with a committee of the National Academy of Sciences, composed of some of the leading scientific men of the nation. who, among other things, recommended that the meteorological work be divorced from military control, and placed with the other scientific work of the government under a commision of scientific men. The joint commission afterward made a thorough investigation of the scientific bureaus, and reported in 1886. In regard to the signal service, the commission reported as follows: —

"The commission do not believe that this work is in any sense military work, or that military discipline and law are necessary to its efficiency. All concur in the opinion that this work is civil work in its nature and character, and that military restraint is not necessary."

Three of the commission recommended the employment of civilians as rapidly as the terms of enlistment of the men then in the signal corps expired, and hence a gradual transfer to a civilian bureau; while three of the commission urged an immediate transfer.

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In 1887 a bill was introduced transferring the weather service of the signal service bureau to the new Department of Agriculture, then about to be formed. This bill was passed in the House, and much discussed and passed with amendments in the Senate. On being returned to the House, it only failed to become a law by the expiration of the time of Congress before it was reached on the calendar. During 1888 it again came up, and passed in the House, but failed in the Senate after long debate, several of the senators who voted against it assigning as their reason that they had not had time to post themselves on the subject, but intended to do so before the next Congress.

It will be seen that the subject of the transfer of the weather service has been agitated in succeeding sessions of Congress since Gen. Logan introduced his bill seven years ago. A perusal of the speeches made in the Senate must convince one that the delay in making the transfer has arisen largely from that natural conservatism which would examine the question thoroughly before making changes in existing institutions; and the attention of the senators has been so much occupied by the larger affairs of the government, that each time the bill is brought up some one will be found saying that he has not had time to examine into the question, and it would be better not to make the transfer hastily. This delay has been encouraged by the strenuous and persistent effort against the transfer which has been made by the military officers holding positions in the present bureau, to whom many of the members of Congress apply for their information concerning the bureau.

In the early days of this agitation it seemed probable to outsiders that the bureau would soon become a civil one. A number of college graduates were induced to join the corps, and several prominent scientific men to attach themselves to it, on this account; and also because Gen. Hazen encouraged the scientific work of the service, as well as the individuality and activity of the members, by the publication of essays giving the result of individual research. At this time, 1882 to 1884, according to the official report of the chief signal officer, the efficiency of the weather predictions, as indicated by the high estimated average of over eighty-seven per cent of success, was the greatest ever attained by the signal service. The scientific activity of the signal service was also at a maximum at this time, as shown by the correction of the improper methods of exposure of instruments by the adoption of new methods, the introduction of improved tables for reducing the observations on which the weather predictions were based, and the publication of numerous essays on various subjects This, too, was at a time when there was the greatest discontent with the essentially severe, but in this work, unnecessary, military control; and open rebellion was not uncommon, though the fate meted out to those who thus dared to differ from the opinion of their chief, forms one of the darkest tales in the annals of our signal service.

During the succeeding years Congress failed to make a civil bureau of the weather service, and the brighter men who had joined the service on account of its scientific work, disheartened by the irksome military control

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of the service, began to drop out; and several of the scientists, who had attached themselves to the service, resigned. At the same time, some of the abler military men, seeing no hope of promotion in the service, returned to the army.

The per cent of success of weather forecasts, shown by the official reports, rapidly declined to seventy-four and seventy-six per cent in 1887 and 1888. The writer does not place entire confidence in these figures, as indicating different degrees of efficiency; but the decrease of efficiency has been widely recognized, and is even admitted by Gen. Greely.

There was, perhaps, more than one cause for the changed efficiency, but it certainly seems as if Major J. W. Powell's words to the joint commission in 1884 were prophetic of the fate of our weather service, when he said: —

"Whenever the scientific works of the general government fall out of the control of scientific men, and into the hands of officers or functionaries whose interest is not in all research, but only in official position and dignity, such a political institution for the advancement of science at once becomes severed from the great body of scientific men: it no longer takes a proper part in the great work to be done, and it speedily decays in influence and value."

During the last year the time covered by the weather predictions of the signal service has been shortened, and the forecasts now extend for a shorter length of time after they reach the public than at any time since the signal service was originated. Thus the forecasts published in the morning newspapers are made to begin at 8 P. M. (seventy-fifth meridian time) of the evening before, or nearly half a day before the public ever sees them. By thus predicting the weather for the night before the public sees the predictions, the per cent of success is increased, and it is probable that on this account the per cent of success given in the next official statement will be higher than in previous years, without necessarily indicating any increased efficiency.

REPLY TO OBJECTIONS TO THE TRANSFER.

The following objections have been urged against the transfer by those connected with the signal corps: —

First. Without military control, it would be impossible to obtain the same promptness of report, accuracy, and continuity of record necessary for meteorological work and weather forecasting.

It seems strange, that while the officers of the signal corps have been continuously urging military control as an essential for obtaining the weather reports with sufficient promptness for accurate work, they have at the same time been utilizing observations made and telegraphed by civilian observers from about twenty stations in Canada. These observations have been made simultaneously with those in the United States, have been published on the same maps, and are just as necessary for the

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accurate prediction of storms on the lakes and North Atlantic coast as are the same number of stations in the United States. The European weather services are entirely civilian, and in these the efficiency has been steadily increasing, while that of the United States under military control has been declining, and is now less efficient than the weather services of any of the larger powers of Europe.

Second. It is claimed that without military control it would be difficult o keep men in places where there were outbreaks of epidemics, and on those far western and southern outposts from which observations are desirable.

The first of these seems a pure assumption, in face of the heroic work done by life-saving men, firemen, and other civilians whose employment necessitates their action in places of danger. As regards the second, it has not been found difficult by State weather services to obtain unpaid, voluntary, civilian weather observers in some of these localities where it is asserted it would be difficult to maintain paid observers; the Canadians have for some time maintained observers at their outposts in Manitoba; and Europeans find no great difficulty in maintaining observations on their mountain peaks, which are the most trying and difficult positions for observation to be found. Moreover, if the experience of these is to serve as a guide, the cost of maintaining such stations will be less under civilian than military control; and it certainly need not be greater.

Third. It has been urged that the cost of the weather service would be increased by civilian control.

This appears entirely contradicted by the fact that the considerable reduction in the cost of the service which has been made during the last few years has been mainly due to the employment of civilian aid in the service. It was pointed out by Lieut. Glassford, in his excellent paper to the joint commission, that a large waste of money was made by utilizing military observers to do work which might be much more cheaply done by civilian messengers. Such messengers have since been employed, with a considerable reduction in the cost of the service, and a further reduction in this direction is possible. In 1888, by the change from military to civilian clerks and civilian methods in the office at Washington, the expenses of the service were reduced about $70,000. In light of these facts, it seems absurd to assert that the cost would be increased by a further civilization of the bureau. The expenditures of the United States weather service is ten times greater than any of the weather services of Europe; and even greater than all of them combined, notwithstanding it is less efficient in weather forecasting.

Fourth. It has been urged that military control is an advantage, because in case of war the military training of the observers would at once fit them for active service, and they would form a nucleus for a larger corps.

If this argument be valid, why would it not be well to keep all of the government work under military control, so that in case of war there would be a large army at once ready for the field?

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Secretary Lincoln wrote to the Committee on Military Affairs, in 1882, urging the transfer of the weather service from the army, and said: —

"Their employment on this meteorological duty is not regarded by them or by the public as temporary, or incidental; and there is no more idea of their ever being detached from it, to do military duty, than our lighthouse keepers will in time of war leave this work, and become sailors on board of naval ships. The work of the Weather Bureau is very important, and its continuance necessitates the organization of a force to perform it; but I have become more and more convinced of the importance of keeping it distinct from military duty."

The bill introduced into Congress by Gen. Logan showed that he held similar opinions. The testimony of Gen. Sheridan before the joint commission showed that he fully shared this opinion. The reports of Secretary Endicott showed that he held similar views. (The writer has not learned the opinion of the present Secretary of War.) Certainly, the opinion of these men ought to be the best attainable on this subject.

Fifth. It has been urged that in a civil bureau the appointments would be controlled by political influence.

As Commissioner Lyman has shown, there is no more reason to fear this, if the bureau is placed under civil-service rules, than there is that inefficient military officers will be retained at Washington, by the influence of friends, as they are sometimes said to be, when it would be for the best interest of the service to remove them elsewhere.

The geological and other scientific bureaus appear to be run very efficiently under scientific control; and why should there be any greater difficulty in the case of the weather service?

Sixth. It has been urged that the government having entered into a contract with the men of the signal corps, it would be unjust to transfer them to a civilian bureau.

It has never been proposed to transfer the signal service, but only the weather service, to civilian control; and it is entirely unnecessary to transfer any more of the *personnel* of the corps than those who desire to follow the weather service; and any one who is acquainted with the men in the signal service knows that most of them would continue with the weather service.

This would allow the men remaining in the signal corps to devote themselves to signal duty, and thus obviate the necessity of forming a new special signal corps, which the general of the army has for several years been asking to be allowed to do, because the present signal corps was so occupied with its meteorological work as not to supply his needs.

THE NECESSITY FOR TRANSFER AT PRESENT.

In his last annual report, and in his letters to the congressional Committee on Military Affairs, Gen. Greely has urged the necessity of some action by Congress to improve the efficiency of the signal service Weather

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Bureau, and it is very probable that something will be done by the present Congress. The Committee on Military Affairs sent in a bill at the last session of Congress, saying: —

"There can be no question but that the signal corps very much needs reorganization and increased efficiency."

In a memorandum submitted to the committee, Gen. Greely wrote: —

"The chief signal officer invites attention to the following condition of the signal corps, which by law consists of 14 second lieutenants, 150 sergeants, 30 corporals, and 320 privates. The appropriations at present are made for only 320 enlisted men. The lack of competent officers in the signal corps has been recognized by the provisions of the annual appropriation bills, which authorize the detail of five selected officers from the line of the army. There have been appointed sixteen second lieutenants whose physical and mental qualifications may be judged from the fact that in the past three years two have died, a third has performed no substantial duty, a fourth is absent under certificate of disability covering a period of fourteen months, a fifth is recommended for retirement on account of mental unfitness, and a sixth relieved from duty at a station by a sergeant, owing to his inability to properly conduct the affairs of an important station. In short, in three years one eighth of the corps has died, and two eighths are entirely unfitted for properly performing the duties for which they are commissioned and paid. . . . Briefly, the physical or mental incompetence, in whole or in part, of eleven out of sixteen lieutenants of the signal corps has been impugned by official action and reports; while of the remaining five, two only have been pronounced competent officers in all respects, and three have had no critical tests, except by the performance of ordinary office duties."

In a letter accompanying this, he says of the officer next in rank to himself: "The senior lieutenant of the corps has been recommended for retirement, owing to the fact that, after ten years of service, he could not properly perform the duties which fall to the more intelligent sergeants of the service."

To correct these evils, Gen. Greely recommends a bill which proposes to put the service on a strong military basis. It contains provisions for the appointment in the signal corps of two majors, five captains, and five first lieutenants; and provides that these officers shall be appointed from the line of the army. It is proposed to weed out the present force of second lieutenants by examination before a board which shall promote the four officers who pass the best examination, and retire the remainder. It also provides that all vacancies which may hereafter exist in the grade of first lieutenant in the signal corps shall be filled by transfer from the line of the army. (This latter provision, the writer understands to mean, that practically all hope is cut off from the sergeants and privates of the signal corps of ever becoming higher officers; and if true, will act as a powerful deterrent to prevent men of ability from joining the corps.)

If such radical changes as these are to be made in the signal corps, is it

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not far better, and is not now the time, to transfer the weather service to civilian control, which Gen. Greely himself admits will probably some time be done, since it has been recommended by all the prominent men in the country, both military and scientific, who have given the matter any attention?

The time for the transfer is now also rife, because the major-general in command of the army is now urging the necessity of a special signal corps for army purposes, and the transfer of the weather-work of the corps would leave those who did not care to follow the weather service time to devote their attention to this important duty, for which the signal corps was originally intended.

The bill making the transfer should provide for the appointment of a chief by the President (which chief should be a man in sympathy with the civilian and scientific work of the service), and should provide for such assistants as might be necessary.

The civilian part of the weather service is now under the civil-service rules, and of course the assistants and others who join the weather service would be selected from those who pass the most satisfactory examinations; but it should be enacted that preference be given to those applicants at present connected with the corps. The bill should be made to go into effect six months or a year after its passage, so as to give time for carrying out these provisions.

At present, the Agricultural Department is the place most appropriate for such a bureau.

If such a bill were passed, the men now connected with the signal service who are most interested in, and best fitted for, the meteorological work would follow the weather service, and some of the brightest young men in the country, many of whom have had experience in meteorological work as voluntary observers, would be induced to enter the service. A new era would dawn in the meteorological work of our government. That this is the opinion of many leading scientists will be seen from the articles which follow.

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OPINIONS OF SCIENTIFIC MEN.

THE REORGANIZATION OF THE WEATHER BUREAU.

By W. M. Davis, Professor of Physical Geography in Harvard University, and Director of the New England Meteorological Society.

[*In New York Evening Post, Jan.* 20, 1887.]

The death of Gen. Hazen will call forth very general discussion as to the selection of his successor, and will necessarily bring the question of the civil reorganization of the Weather Bureau again prominently before the public. There ought to be no division of opinion on two points: first, that the director of the Weather Bureau should be qualified for his position by a scientific knowledge of meteorology as well as by executive ability; second, that the work of observing and predicting the weather is eminently a peaceful, and in no sense a military, art. We do not look for any popular support of the military opinion which proclaims, officially, that "the whole theory of the organization is, that the entire force of the signal corps shall be available for immediate service in case of war." What the people at large wish is simply the announcement of the "approach and force of storms throughout the United States, for the benefit of commerce and agriculture" in time of peace Soldiers are not needed for this work, and the attempt to give the weather observers of the signal corps a military character has been chiefly of use in keeping the service under the control of army officers.

It is not a little curious to remark that the more notable changes introduced in the administration of the bureau by Gen. Hazen have been distinctly civil in their nature, and this in spite of his frequently repeated statement that the signal corps was maintained for military service. Nothing shows this better than the assistance he has extended to the formation of State weather services, entirely voluntary and non-military in their nature. These are now organized in many of the States, and their number is at present increasing almost every month. They excite much popular interest, especially in the South and West (where newspapers are slow to reach the out-of-town population), on account of the greater publicity they give to the weather predictions by means of flag displays at railway or telegraph stations. The plan of fostering intimate relati ns between the general and local services is really admirable, but it is eminently a civil relation, not in the least aided by military manners. Indeed, when we review the history of the signal service, nothing is more distinct that the steady increase of its civil and scientific sides so that now the

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share that army work has in it is left merely as an incongruous, unpleasant feature in the background. It might well be omitted altogether. A review of this change in its attitude is pertinent here.

The signal service, as a separate organization, may be traced back to 1860. when there was added to the staff of the army "one signal officer, with the rank, pay, and allowances of a major of cavalry." In 1866 the chief signal officer was given the rank of colonel of cavalry, and his corps consisted of six officers and not more than one hundred non-commissioned officers and privates, detailed from the battalion of engineers, for the performance of military duty. In 1870 the chief signal officer was directed to secure meteorological observations, in order "to give notice on the northern lakes and on the seacoast by magnetic telegraph and marine signals of the approach and force of storms." The signal corps came into public notice with this order, and Gen. Myer earned the lasting remembrance of the people by his energy in instituting our weather service. In 1871 the limitation of the work to the lakes and seacoast was omitted in the appropriation bill, and in 1872 announcement was required of the "probable approach and force of storms throughout the United States for the benefit of commerce and agriculture." In 1880 the chief signal officer was given the rank and pay of a brigadier-general. During the decade, 1870–1880, the number of men in the corps was largely increased. The appropriations for the support of the service run as follows: —

Year.	Observations and Reports.	Telegraph Lines.	Deficiency.
1870	$15,000		
1871	102,451		
1872	250,000		
1873	296,825		
1874	355,325		$45,000
1875	415,000	$88,000	55,000
1876	300,000	45,000	
1877	300,000	22,000	
1878	350,000	95,000	
1879	375,000	90,000	
1880	375,000	75,000	
1881	375,000	75,000	
1882	280,000	40,000	

Up to this date the pay of the men had not been included in the estimates, but came from the army bill; hereafter it is included, and the appropriations for 1883 were $963,674.57; for 1884, $926,132.08; for 1885, $904,080.

It cannot be supposed for a moment that this enormous growth of the service was in any way an expression of the interest of the people or of Congress in the organization of a corps "available for immediate service in case of war." The recommendations of Boards of Trade, of Chambers of Commerce, and of agricultural societies have never been based on the

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desirableness of instruction in military signalling. Yet, in the reports of the chief signal officer, military signalling has been continually given the first place and the chief emphasis under the head of "Instruction," and meteorological studies have been secondary and subordinate, although the meteorological work of the corps now so vastly exceeds the military work. The importance of an experienced signal corps in every well-organized army is not disputed. This question is not in discussion in the public mind; it is taken for granted that it will be properly attended to in the regular army, along with infantry drill, cavalry manœuvres, and artillery practice, each in its proper place. It is a mere accident, partly historical, partly verbal, that there is any present connection of matters so dissimilar as weather prediction and military drill. There is now a good opportunity of dissolving this connection altogether. During the life of the late chief signal officer, it would have been an ungracious task to remove him, after he had given up his whole energies, with good result, to the improvement of the service.

There is competent opinion in favor of a civil organization of the Weather Bureau. In 1884 a committee of the National Academy of Sciences recommended, in response to congressional inquiry, that the meteorological work of the signal service should be put under the general control of a non-military meteorological bureau, to which should be transferred so much of the present *personnel* and functions of the signal office as is not necessary to the military duties of that office. The joint congressional commission on the signal service and other scientific bureaus of the government reported last summer, after an extended investigation, that the work of the Weather Bureau is civil work in its nature and character, and that military restraint is not necessary to its success. Three members of the commission were in favor of gradual and three in favor of immediate transfer to a civil bureau. In 1884 the Secretary of War, Mr. Lincoln, stated that he entirely agreed with the committee of the National Academy in their recommendation. He had, two years earlier, advised "that a civil establishment to conduct the Weather Bureau service be organized." It is to be hoped that the present Secretary of War will exert the weight of his opinion to the same end.

THE WEATHER SIGNAL SERVICE SHOULD BE NON-MILITARY.

By N. S. Shaler, Professor of Geology in Harvard University.

[*In Boston Herald, March* 10, 1889.]

The condition of the United States Signal Service Bureau, which prepares the weather predictions, has long been a source of anxiety to those who are interested in the several departments of our national science system. The predictions given by the officers of this corps, though of much value, have not appeared, to those entitled to criticise them, up to the

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attainable degree of perfection. The cost of the bureau is great, though it is even less than the country would be willing to pay for a satisfactory service. The United States spends probably more for this work than all the states of Europe, yet the weather predictions have on the whole been less successful than those in the Old World. Although this bureau has been in operation for nearly twenty years, it has failed to develop a set of able meteorologists competent to define the laws of the weather on this continent, and to advance the science of meteorology. Although the bureau has gathered a great body of fact concerning the atmospheric conditions of this continent, it has not succeeded in doing any considerable amount of true investigation. This, however, would have been more pardonable if the practical work of predictions had attained the desired end.

When Gen. Greely took charge of the corps there was good reason to hope that he might succeed in effecting a reorganization which would increase the efficiency of the Weather Bureau. No one could have been selected who better embodied the valiant sense of duty required in such a position than this hero of Arctic exploration. When the corps failed to gain in efficiency, it was felt by all who knew Gen. Greely that the difficulty must be of a radical sort. A recently published statement from the chief of this corps makes it plain that the evils which beset its management are of a kind which cannot be eradicated by any administrative skill or devotion on the part of the director to its work. It appears to lie in the nature of the men employed, in the tone, or lack of it, which pervades a portion of the subordinates employed in this great work.

The Weather Bureau developed from the signal service of the United States army. The original object of the corps, as its name indicates, was to serve for the purpose of communicating information between the several parts of an army on the march or in action. As a subordinate part of the machinery employed during our Civil War, it did admirable service. If, when it assumed its new duties as a meteorological corps, the officers and men had been transferred to some one of the civilian divisions of the government work, there can be hardly any doubt that the corps would now have the foremost place among the scientific institutions of the country. The United States is singularly well placed for the development of meteorological science. and the people have a measure of intelligence which well fits them for the ready appreciation of such aids to their life as this branch of learning can afford. Unfortunately, however, the corps was retained in connection with the army. Noble as is the system of an efficient military organization, it is thoroughly evil when it is applied to work such as inquirers are called on to do Even where, as in the Weather Bureau, certain parts of their acts must be performed with studious regularity, they can best be done under the conditions of a civilian, and not of a military, corps. The military influence is of necessity penetrative and dominant. If men are soldiers at all, they must be soldiers through and through in order that the system be reasonably perfect. Under the present system of the signal service, the observers are men enlisted in the United States army; they are thereby essentially separated from all the con-

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ditions which prevail in the non-military work of the state. Their first duty is not to prosecute natural inquiries, but to obey the commands of their superior officers. The life of an enlisted man in any army is not such as to be attractive to youths of character and ability, and it is therefore not surprising that few men of capacity have sought service as sergeants in the weather service. Thus, while Harvard University has sent more than a score of men to the work of the national and State geological surveys of this country, few of its graduates have sought a place in the lower ranks of the signal service. College officers have hesitated to advise a man to seek such a position, while if the corps was on a civilian basis these chances in life would be extremely attractive to young men of ability. Therefore it seems that the best, if not the only, thing to do, in order to give the desired quality to the signal service, is to transfer it to some non-military division of the government work.

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DESIRABILITY OF THE TRANSFER OF THE WEATHER SERVICE.

By T. C. Chamberlin, President of the University of Wisconsin.

[*Letter to Senator John C. Spooner.*]

My dear Sir, — I observe with gratification that the Hatch bill, relating to the Agricultural Department and the transfer of the weather service to it, has passed the House by a very large majority, but I regret to learn that the Senate committee, in favorably reporting it, have stricken out the clause making the transfer of the Weather Bureau. Permit me to express the very firm conviction that this amendment is unwise. The transfer of the Weather Bureau appears to me to be one of the most excellent features of the bill; indeed, from my perhaps partial stand-point, the most excellent. It seems obvious, upon the statement of the case, that a bureau of so great importance to the commercial world, and of so great possibilities to the agricultural interests of the country, should be placed in the hands of professional meteorological experts, and should be organized for its own ends. At present it is placed in the charge of a military officer, whose natural functions are entirely foreign to this service. It is furthermore connected with a military signal service whose methods and purposes are entirely foreign to those of the Weather Bureau. Almost the only thing they have in common is the name, "signal."

It is obvious to all who have carefully studied the workings of the weather service that it needs reorganization on a modified basis, if it is to advance in economic value, and to become in the highest practical degree subservient to the interests of agriculture. It must be rendered more exact, and be made more specifically applicable to the peculiarities of the different regions and to the needs of different agricultural industries. In other words, there must be a higher degree of local adaptation. This is entirely practicable, as it seems to me, and not by any means expensive, compared with the great results that can be obtained.

So far as I know, all competent scientists who have given attention to this subject are of one opinion respecting the advisability of a transfer of the weather service to some civil department, and the placing of it in the charge of an officer selected on account of his especial fitness for its duties.

At the closing Farmers' Institute a resolution was passed requesting me to correspond with members of Congress, urging this transfer, and further urging the reorganization and local adaptation of the system. In the pressure of other work it appears that I have been dilatory in properly representing this large and important body.

I should be much gratified if these views find a hearty response in your own convictions, knowing that you will exercise a very important influence upon the disposal of the amendment.

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THE OBSERVERS OF THE SIGNAL SERVICE FAVOR THE TRANSFER.

OPINION OF FRANCIS E. NIPHER, PROFESSOR OF PHYSICS IN WASHINGTON UNIVERSITY, AND DIRECTOR OF THE MISSOURI STATE WEATHER SERVICE.

[*From a circular dated Aug.* 23, 1889.]

About ninety-eight per cent of the signal service observers are very much dissatisfied with their treatment, and wish a transfer to a civil bureau. The constant removal of observers from one station to another is supposed to be for the purpose of preventing them from becoming acquainted and bringing influence to bear upon members of Congress, for the civilization of the Weather Bureau.

[*From a letter concerning the transfer of the weather service.*]

The plan should transfer all privates and observing sergeants, where there is no reason for their discharge as worthless. Most of them are good men. All military officers should be required to elect between resignation of their commissions and weather service, and holding their commissions and army service.

COMPARATIVE COST AND EFFICIENCY OF THE UNITED STATES AND FOREIGN WEATHER SERVICES.

BY H. HELM CLAYTON, OBSERVER IN CHARGE OF BLUE HILL OBSERVATORY.

[*In Boston Post, Feb.* 16, 1889.]

Sir, — In an editorial note in Thursday's *Post* you seem inclined to doubt the wisdom, if not the truth, of the sweeping assertion of the inefficiency of a large part of the signal corps, made by Gen. Greely in his recent report to Congress. Gen. Greely may possibly not be right in his specifications as to exactly what persons are inefficient, but any one who has studied the history of our weather service, in comparison with that of foreign countries, can scarcely doubt but there is great inefficiency somewhere in our service, and it seems right to allow Gen. Greely every assistance possible to improve the service, until there is proof that his efforts are in the wrong direction. The financial support and the facilities afforded our signal service are the best in the world, and it has been a continuous surprise to the writer that its efficiency has not been greater. The following figures show in round numbers the amount of money appropriated by various governments in Europe and America for the support of their weather services: United States, $900,000; Great Britain, $80,000; Germany, $56,000; Russia, $65,000; Austria, $10,000; Switzerland, $6,000;

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France, $40,000. This estimate for France does not include the cost of observations made at a few astronomical observatories and mountain stations, which may perhaps increase the total amount expended by France to $60,000. It is thus seen that the amount of money appropriated for its weather service by the United States is ten times greater than that of any country in the world, and is greater than the amount appropriated by all of the governments of Europe combined, including Italy and others not mentioned above.

In Europe a large part of the observers are voluntary observers; or they are men who are engaged in other pursuits, and for a small compensation take meteorological observations, and telegraph them to the central stations. For this reason, it has been necessary to adapt the observations somewhat to the convenience of the observers, and it has been impossible to obtain all over Europe a system of simultaneous observations such as are obtained in the United States. The principal set of observations in the different European countries is taken all the way from 7 A. M. to 9 A. M., and on account of the difficulty of arranging codes and transmitting telegrams from one country to another speaking different languages and having different interests, it is almost noon before the morning observations are in an available form in the different countries for use in making weather predictions, while in the United States it is but little more than an hour after the observations are taken before they are available for use at the central office. Again, owing to their small appropriations, none of the European countries have been able to obtain extensive reports more than once a day from surrounding countries, and thus form a set of relatively complete weather maps, such as was previously done three times a day in the United States, and is now done twice a day. The full weather map made by the European weather services is from the morning reports taken between 7 and 9 A. M., though most of the services make supplementary maps from less complete reports received in the afternoon and evening.

So far, it is seen, then, that our weather service is better equipped and with far better facilities for effective work than any service in the world; but what are the results? In 1881 the per cent of verification of their weather predictions estimated by the French meteorological office was eighty-two. Since then it has steadily risen, until, in 1887, a verification of ninety per cent was claimed. In the same manner the per cent of success estimated by the London office for Great Britain has risen from seventy-eight per cent in 1882 to eighty-three per cent in 1887. In Germany the per cent has risen from about eighty per cent ten or twelve years ago to eighty-eight per cent in 1887. According to the official verifications of our signal service, the per cent of successful weather predictions rose from about eighty-two per cent in 1875 to eighty-nine in 1883, and then decreased irregularly to seventy-four per cent in 1887, or eighty-one per cent when corrected for the greater interval covered by the predictions. These signal-service verifications for different years are not strictly comparable, because they were verified according to varying rules.

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and with different degrees of care; but the signal service uses them so, and the figures at least agree with the general impression that there has been no increase in the accuracy of the signal-service predictions during the last fifteen years. Neither are the per cents of verification for one country comparable with another, since many of them were verified by different rules; but the results are comparable among themselves, and the steady increase of accuracy claimed for the European weather predictions is no doubt a fact. The able papers and investigations proceeding from the members of the European bureaus seem sufficient evidence that great thought is being given to the improvement of meteorology, and the advance of meteorological knowledge is undoubted.

The great difficulty with our bureau seems to have been that Congress made it a military rather than a scientific organization. Several years ago a committee appointed to investigate the bureau recommended that it be transferred to a civilian organization, either gradually or suddenly. The National Academy of Sciences, when consulted on the subject, recommended the same thing; but for some reason unknown to the writer, Congress has neglected or refused to make such a transfer, and last year struck out a clause to that effect in the agricultural bill. There is scarcely any doubt that with some scientific investigation certain of those storms might have been predicted which in recent years have struck our coast unheralded by the signal service, and left wreck and ruin behind; notably the storm of Jan. 9, 1886, for which no signals were ordered, and in which it is estimated that about one hundred and twenty-five vessels were wrecked on the New England coast. Were the weather service of our country in the hands of well-selected scientific men, it would undoubtedly become, as it ought to become with such splendid facilities as it now has, one of the finest meteorological bureaus in the world. If, however, this cannot be, it is hoped that every facility will be furnished Gen. Greely to make it an effective military organization. Gen. Greely's recent books and excellent Report of the Lady Franklin Bay Expedition to the Arctic Regions indicate a deep interest in and a knowledge of the needs of meteorology, and he is no doubt sincere in his efforts to increase the efficiency of the signal corps.

Besides the reorganization of the bureau, an immense advance might be made by organizing local predicting bureaus where the predicting officers could make a closer study of the conditions surrounding them, and gain more time for prediction, instead of, as now, being compelled rapidly to make predictions for almost the entire length and breadth of our land, which is many times larger than any country of Europe, except Russia. The favor with which the Blue Hill predictions, as well as those of others in this and other parts of the United States, have been received seems proof that local weather bureaus would be at once appreciated by the public.

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THE EFFICIENCY OF THE SIGNAL SERVICE IMPAIRED BY ITS MILITARY ORGANIZATION.

By H. Helm Clayton.

[*In Boston Transcript, January*, 1887.]

To the Editor of the Transcript: —I was much interested in the letters which appeared in your paper some days ago on the "Signal Service Weather Predictions." I continually meet persons who, in regard to the value of the predictions, hold all variety of opinions, from very bad to very good; but in whatever light we regard them, I am confident there is one thing not noticed by your correspondents which prevents these predictions from being better than they are, and that is the military organization of the Weather Bureau. It seems to me unreasonable and unwarranted by facts to assume that a military officer, whose training has been largely taken up by military affairs, could be placed for a year or two at a time in the discharge of scientific work requiring the highest skill, and do it as well as it might be done by a man who has been especially trained in scientific work, and follows his specialty as a profession.

With the vast amount of material concentrated at Washington, and the rapidly growing knowledge over the world of meteorological sequences, I am certain that the predictions of our Weather Bureau could be made more accurate than they are if the bureau were not hampered by its military organization, and were directed by a chief who thoroughly understood the capabilities and needs of meteorology.

Not only does the military organization fail to give the best results which might at present be obtained, but I believe it is immensely detrimental to the advance of meteorology to a higher and more scientific position. In Europe, the men in charge of the weather services are scientific men, who not only do their present work well, but, sustained and enthused by their work, are investigating the difficult problems which present themselves, and thus rapidly pushing meteorology to a higher standpoint.

The most notable advances in meteorological knowledge made in this country have been made by men not connected with the signal service, and who have had to pursue their investigations as best they could at the expense of their own private means.

The value which accurate weather forecasts must be to a large portion of our population who are interested or dependent in their actions on weather changes seems to me to demand the highest skill which can be obtained in this department of the scientific work of our government; but I fear the difficulty which is always found in changing anything which has once become a working part of a large organization like our government, will long maintain our Weather Bureau in its present condition.

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THE LOGICAL PLACE FOR THE WEATHER SERVICE IS IN THE AGRICULTURAL DEPARTMENT.

[*Letter to Senator Butler, from the President of a leading State Agricultural College.*]

Dear Sir, — By to-day's *Congressional Record* I have been much pleased to see your approbation of the transfer of the Weather Bureau to the proposed enlarged Department of Agriculture. Permit me to express the hope that your efforts to secure the rejection by the Senate of the pending amendment of the House bill will be vigorously renewed on Monday.

There seems to be very general agreement that the weather service, by itself, divorced from the technical signal service of the army, is more closely related to agriculture than to any other industry or interest; that the proper logical place for its administration is under the Department of Agriculture; that being a purely civil service, its organization and administration in military form throughout is an anomaly; and that even as it exists (as claimed by the chief signal officer himself), the service sadly needs reorganization.

The main difference of opinion is, therefore, as to the expediency of entering upon a reorganization at this time and in connection with the proposed rational transfer. I know that I am not alone among those outside official circles and legislative halls, who have given the subject much attention from a combined agricultural and scientific aspect, in believing that a better time and more favorable circumstances for effecting this desirable change, easily, efficiently, and economically, are never likely to exist.

Seeing your interest in the subject, and the general concurrence of your views and ours, I venture to send some of the reasons occurring to us.

First. If new law is desirable to "enlarge" the Department of Agriculture, is it not well to increase in some other way than by substituting, at almost treble cost, a secretary and an assistant secretary to perform the duties already well executed by a single commissioner?

Second. The House bill amply provides for bridging over the transitory period without a break in the service. The agricultural colleges and the newly formed or forming experiment stations constitute a *cadre* organization upon which the new system can be soon developed and perfected at a very moderate cost. My own belief is that within a year practical utility could be increased and the total cost actually decreased. The service thus transplanted would be in a congenial atmosphere, and in the hands of efficient men, earnestly interested in its success. At every State college or university with an agricultural experiment station attached (and such an institution exists in almost every State) the need is already felt of a complete meteorological record, including observations of the physics of the soil as well as of the atmosphere, as an essential part of the work. Several of these institutions have thought it necessary to establish weather bureaus of their own, local, or covering their States. The efficient State

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weather service in Alabama is organized at and managed by an officer of the State Agricultural College. The same is true of Ohio, and applies in a measure to Tennessee and Wisconsin. The United States signal service depends largely upon these State organizations and officers for its local information. Other States are at this time arranging for similar service. The Massachusetts experiment station at its Agricultural College has just procured a meteorological equipment, equalled in this country only by those at the government office in Washington, and at Central Park, New York. Only last Wednesday the Associated Press dispatches published the details of arrangements just perfected at Cornell University for a State weather service, and the issue of daily bulletins, with predictions or probabilities. (See New York *Times*, Sept. 12.)

It is absurd for the chief signal officer of the army to express a fear, as he did before the Senate committee, that the work would fall into incompetent hands if this transfer were made. In almost every State men of scientific attainments, well trained for just such service, are now on duty, and could at once assume the direction of this meteorological work. They are fully the peers of those who now have the service in charge, and far exceed the latter in number. As stated a good many of them are already the local representatives and agents of the present bureau. The local observers, scattered over the country and doing only civil duty, would be but too glad to escape the unpleasant status and disadvantages of being "enlisted men," and transfer their services to the control of these State officials, or a civil chief at the Agricultural Department. There is a man at your own State University at Columbia, now engaged in work of like nature, who has already demonstrated his right to be classed as a meteorologist equal in ability to any in the signal service. Another could be named, in Indiana, whose experience and capability fit him to assume at any moment all the duties of the chief of the army signal corps that is, or the Weather Bureau of the new Department of Agriculture that is hoped for, without detriment to the service.

Third. (Personal.) It cannot be doubted by candid observers that if the weather service alone were transferred to the Agricultural Department, and with a new civil chief, leaving the present chief signal officer to his military service proper, there would be a great public gain.

THE APPOINTMENT OF MEN UNDER CIVIL-SERVICE RULES AS MUCH AN ASSURANCE OF COMPETENCY AS UNDER MILITARY REGULATIONS.

By Civil Service Commissioner Lyman, Jan. 20, 1888.

Civil Service Commissioner Lyman, speaking of the proposition to transfer the Weather Bureau to the Agricultural Department, placing it under civil authority, said to-day, that he thought the argument credited to Gen. Greely — that the service would be embarrassed by being brought

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under the operation of civil-service rules—would soon fall to the ground if serious consideration was given it. Gen. Greely, Mr. Lyman said, is quoted as instancing the case of an observer at a distant post, for some reason leaving the service, and asking whether the delay required to fill the place by civil-service examination would not be a serious hindrance to the service. "This," Mr. Lyman said, "is only dust. The fact is, that if the Weather Bureau became a part of the civil service, there would be little change from the present methods, and no more delay in filling places than at present. Now, men before they enlist or are accepted for the service pass a primary examination, and then are appointed on probation, and given a course of instruction in the special arts with which they are required to be familiar. While under instruction their progress and proficiency are tested from time to time by examinations. This body of men in the service on probation form the source of supply from which vacancies are filled. Under the civil-service rule, the only difference necessarily would be that there would be no enlistment in the army, but men would enter the service through a preliminary examination. They would be appointed on probation, and go under instructions. The same source of supply for filling vacancies in the service would be maintained as at present.

"Undoubtedly, incompetent men would get appointed on probation under such a system, as they do at present. The period of probation would show that they were unfitted or not adapted to the service required of them, and they would be dropped, just as now men are discharged who are found incompetent for any reason. But, on the whole, I think the service would be greatly benefited. It would have a choice from a better class of men. Men do not like to enlist in the army, and bind themselves to a service for three or five years. If it were voluntary, if they were at liberty to quit the service when they chose, I think you would find more men of the intelligence needed for the work, seeking for appointment. Gen. Greely, I think, bases his argument against the application of civil-service rules to the service on the experience he has had in filling places in his office, now included within the operation of the civil-service law. A vacancy occurred in a junior professorship, and the commission being called upon to fill the place had to hold an examination, and, of course, there was delay. Gen. Greely himself was at fault, because he did not notify the commissioners until after the vacancy occurred. If he had given notice of a prospective vacancy, the commission would have been ready."

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OPINIONS OF THE PRESS.

Perhaps this heading should have been *opinions of the Boston press*, since the compiler resides at Boston, and rarely sees papers from other cities; but from a few of these which have come under his notice, extracts are given. From these extracts and from what intelligence he can gain on the subject he feels sure that the opinion of the Boston press represents the opinion of the intelligent press throughout the country. All of these have appeared within the last eighteen months, except those from the Boston *Transcript*, which appeared in 1887.

[*From the Boston Transcript.*]

Now that the question of reorganizing the signal service is before the public, it may be worth while to suggest that the dissatisfaction with the department can hardly be remedied, even by putting an efficient and popular officer at its head. The fault lies in the centralized system upon which our weather is administered. It stands to reason that no one man can acceptably furnish weather for this broad land, and the remedy lies in a division of the power. . . .

There is really no good reason why weather observation should not be divorced from military signalling. Study of the last might be carried on at comparatively little expense as a part of the duty of the army. The army, in times of peace at least, alone has any interest in military signalling. The whole country, on the other hand, is interested in the observations of the Weather Bureau. No branch of the public service enters more by its daily operations into the every-day life of the American people. As the efficiency of the service would not be impaired by civil control and a purely scientific organization for meteorological observations, it would be certainly in the line of development to take it out of the army, with which it has no necessary connection.

[*From the Boston Evening Record.*]

Is there any reason on earth why the weather signal service of the country, which ought to be a scientific institution of great value to our farming and shipping interests, is allowed to become a mere byword? . . . The sooner the Weather Bureau is transferred to some civilian department of the government, the better.

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Even Gen. Greely admits that the Weather Bureau has "certain defects." Has it anything else that is certain?

Gen. Greely says the Weather Bureau is all right, and he does not wan it transferred to the Agricultural Department, because then it will have to come under civil-service rules. What's the harm? Just as though enough civil service could be infused into the bureau to make the weather reports less reliable. He probably fears that it would be a cold day when the change was made.

[*From the Boston Advertiser.*]

A writer in *Science* very properly asks the question, why it is that the percentage of successful indications from the signal-service reports was only 73.9 last year, while in 1883 it was 89.1. It may be answered that predictions are now being made thirty-two hours in advance instead of twenty-four hours, as formerly, but this difference should not justify such a marked falling off in accuracy. Most liberal appropriations have been made to promote the efficiency of this service, and the character of its predictions should have improved steadily as its field of observation has been extended. This is not the case, and the country wants to know the reason for it.

[*From the Boston Herald.*]

There is a growing belief that the administration of the signal service is not so effective as it should be. Mistakes in making weather prognostications are likely to occur under the best-regulated system, and although the people in this part of the country have had to witness in the last few weeks an unusually large number of weather predictions falsified by subsequent events, these failures to foresee what is coming may be due to causes which could not, under any circumstances, be prevented.

The science of weather prediction is still in its experimental stages, and although we know much more than we did a few years ago, and have means of obtaining certain intelligence from a greater number of widely separated points, there are many things which we do not yet understand, and many points, as, for example, the Atlantic Ocean, from which prompt and regular reports cannot yet be obtained.

The signal service has in the last few years collected an immense mass of information of a meteorological character; but, as we are given to understand, it has not yet produced a man with what may be called the synthetic ability to draw from this great aggregation the general laws in accordance with which changes in the weather are brought about.

What seems to be needed at the present time is not so much skilful and accurate observers — for these it is generally conceded we have — as the possession of some one of profound scientific attainments who can treat meteorological data in something the same manner that Mr. Darwin treated the immense number of facts which he collected, and educe from

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them the laws in accordance with which climatic changes are brought about. Gen. Greely, and perhaps all of his military assistants, are able men in their way, but they do not seem to possess the mental material out of which great scientists are made.

If the signal service is to retain its popularity, it must constantly progress, and it is not much to say that within the last year or two no special progress has been noticeable. To merely hold its own, and deliver judgments which sometimes prove right and sometimes prove wrong, is to fall below what the American people believe they have a right to demand of this important branch of the public service. We are well aware, as we have said above, that the work is carried on under unfortunate limitations as to the area of the earth's surface from which regular daily reports are received; but, even after conceding this, it seems to us that more could be achieved by well-directed scientific research than is now secured; for apparently we have, at present, many facts from which those who possess them have not yet been able to deduce their true meaning and effect.

[*From the Boston Post.*]

That our signal service is not so good as it should be, or at least that the weather predictions which it puts forth are far less satisfactory now than they were once, is a fact well enough established to admit of little discussion. The reasons for the deterioration, however, have been variously stated. Gen. Greely himself, in a communication to the Secretary of War to which we have already called attention, does not hesitate to place the blame with his subordinates in the corps. He finds no especial fault with the system of issuing predictions, but he insists that of the sixteen lieutenants of the force, eleven have had their physical or mental competency impugned by official reports. If this be the case, there can be no doubt of the need of an immediate reorganization. In a recent letter to the *Post*, Mr. Clayton, the efficient observer at Blue Hill, argues that the root of the troubles lies in the fact that the corps is a military rather than a scientific organization,— a position which, although it does not justify Gen. Greely's charges in detail, yet supports the theory that the *personnel* rather than the system is responsible for the comparative failure of recent weather predictions. Without attempting to pronounce an opinion off-hand upon so difficult a question, it may be observed that the general accuracy of Mr. Clayton's own predictions confirms the wisdom of our suggestion on a former occasion, that forecasts of local weather should be issued by local observers, and not altogether from the central bureau at Washington. Only by such a method, it seems to us, can the full value of local indications be obtained.

Just how inaccurate the predictions as at present made up often are, the record of the past week will show. The following table gives the bulletins sent from Washington, in comparison with the actual weather of the week: —

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OFFICIAL PREDICTIONS. (*To cover day following date.*)	ACTUAL WEATHER.
Feb. 17. — For New England and eastern New York, fair, colder; westerly winds.	Feb. 18. — Very heavy rain, with hail, lasting until evening, when it cleared. Highland Light reports the rain as the heaviest for six months.
Feb. 18. — For New England and eastern New York, clearing, much colder; brisk northwesterly winds, high on the coast. Storm signals are displayed on the coast from Eastport to Hatteras.	Feb. 19. — Day opened warm and spring-like. Afternoon cloudy, with snow-squall, clear and cooler at sunset. Winds northwest all day.
Feb. 19. — For New England and eastern New York, fair, colder; brisk northwesterly winds, high on the coast. Storm signals are displayed on the Atlantic coast from Sandy Hook to Eastport.	Feb. 20. — Day opened warm. Thermometer 35 degrees above zero at 12.30 P. M. in the shade. Warm through the afternoon. Moderate to fresh northwesterly winds; no gale.
Feb. 20. — For New England and eastern New York, fair, colder; followed in Connecticut, Massachusetts, Rhode Island, and southern portion of eastern New York by rising temperature; variable winds.	Cold morning, 20 degrees above zero. Fair all day, becoming warmer at evening.
Feb. 21. — For New England and eastern New York, fair, warmer; southerly winds. Cautionary signals are displayed from Sandy Hook to Eastport.	Morning warm, cloudy, southerly winds, became cooler at sunset, with high southerly winds.
Feb. 22. — For New England and eastern New York, snow; much colder; high northwesterly winds; gales on the coast. Storm signals are displayed on the Atlantic coast from Norfolk section to Eastport.	Morning cold, 10 degrees above zero. No snow here. Snow off the coast.

It will be seen by an analysis of this table, that out of six predictions three may fairly enough be characterized as absolutely wrong. Instead of "fair" and "colder" we had heavy rains; the day which was to have been "much colder" opened warm and closed cooler, but by no means very cold, after snow-squalls which had not been predicted; the third day, which should have been, according to the bulletin, "colder," was comparatively warm throughout, the thermometer registering three degrees above freezing point about noon. The fact that for the rest of the week the

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predictions were substantially accurate is encouraging, but not wholly satisfactory. If our weather predictions are to be wrong half of the time, — as they were last week, — then it is plain that reorganization is needed in some direction, whether it be in *personnel* or in system.

Nor can it be argued in defence of the signal service that it is poorly sustained by the government. In the letter to which we have alluded, Mr. Clayton showed that "the amount of money appropriated for its weather service by the United States is ten times greater than that of any other country in the world, and is greater than the amount appropriated by all of the governments of Europe combined." Furthermore, many difficulties which have to be met in Europe do not exist here. Yet, according to Mr. Clayton's figures, while foreign predictions show an increasing percentage of verification, in our own the percentage is diminishing. In Great Britain the percentage in 1887 was eighty-three; in France, in 1887, ninety; in the United States, in 1887, seventy-four. These results make it difficult to resist the conclusion that a civilian body of scientists in our signal corps might achieve better results; certainly no one would expect them to achieve worse.

[*From Lincoln, Nebraska.*]

The signal-service people in Washington predicted this cold wave with considerable accuracy, but why is it that they are never successful with storms coming from the eastward?

[*From the Chicago Journal.*]

The signal-service weather predictions are as faulty as ever. It is safer to bet on the election than to bet on the signal service.

The signal service, whose prognostics are quite as often wrong as right, predicts "fair and cooler weather" for to-morrow.

[*From the New York Times*]

According to the statement of Gen. Greely, chief signal officer, the man who is responsible for much of the irritation of the public mind by the failure of the bureau to predict the monotonously bad weather we have had for three weeks, is one Prof. Hazen, who has had the weather of this region under his care. This gentleman, it seems, is a civilian, and though as intelligent and skilful as a mere civilian could be expected to be, he has not had "experience" in this particular line. Gen. Greely apparently thinks that there is some connection between the peaceful character of the professor's education and the failure to guess right on the weather. If that be so, it is conclusive as against intrusting our climate to any man without shoulder straps. But we cannot reconcile this theory with the general's

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other statement that if he himself should give up the bureau, as he would if it were transferred to the Agricultural Department, it would fall into the hands of the officer next in rank, who is "thoroughly incompetent" It seems as difficult to predict, from the mere status of a signal officer, whether he will be a good guesser or not, as it is to tell from the daily "probabilities" what the weather is likely to be.

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SUPPLEMENT.

In the annual report of the chief signal officer for 1889, which has just been issued, Gen. Greely says: —

"The deterioration of army signalling in 1887–88 has steadily increased, and at the end of the fiscal year the condition of signal instruction in the army is at the lowest ebb it has ever known. The records show that less than one officer out of nine of the line of the army has received instruction in signalling during the year; less than one in twenty-two averaged one hour's instruction monthly, even including the most elementary branches."

He says the average per cent of weather forecasts was eighty-one. In previous reports he estimated that decreasing the length of time covered by the forecasts from thirty-two to twenty-four hours would increase the success seven per cent. Hence, in order to compare with immediately preceding years, it is necessary to subtract this, which being done leaves seventy-four per cent, showing that the efficiency of the predictions remains practically the same as in the two preceding years.

He recommends the reduction of the corps by one hundred and fifteen men, saying that their work could more economically devolve on civilian assistants, thus confirming what has previously been said in this pamphlet; but it seems difficult to understand why it would not be better to make all of the men civilians, and thus prevent the inharmonious action which is sure to arise in a corps partly under civilian and partly under military regulation.

He recommends the appointment in the signal corps of two majors, five captains, and five first lieutenants; and says the grade of second lieutenant should expire.

If these new men are to be appointed to the signal corps, as he recommends, why should majors and captains be appointed to do this work instead of professors of science? The writer does not believe the good sense of the public or of Congress will approve of this as the best possible measure.

If Gen. Greely's bill is passed it will firmly settle the military organization upon the service for many years, and perhaps permanently; since the newly appointed officers, with their comparatively large salaries and considerable personal influence, will of course add much to prevent any future change in the status of the service. At Gen. Greely's death the directorship would fall to the next officer in rank, irrespective of whether he was most fitted for the place or not; instead of the chief being chosen from the most capable men of the nation, as he would be were the service a civil one.

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